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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/762,985

Applicant(s)

BECKER ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31-45 and 47-71 is/are pending in the application.
- 4a) Of the above claim(s) 31-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-45 and 47-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 42-45, 47-53, and 61-71 are rejected under 35 USC 103(a) as being as obvious over Kadomura, U.S. Patent 5,662,819 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687.

Kadomura shows the invention as claimed including a method for etching a silicon body substrate using an inductively coupled plasma comprising an ICP source 52 for generating a radio-frequency electromagnetic alternating field, a reactor (51,57) for generating the inductively coupled plasma from reactive particles by the action of the radio-frequency electromagnetic alternating field on a reactive gas, and a first means for

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generating plasma power pulses (see abstract) to be injected into the inductively coupled plasma by the ICP source, the method comprising the step of injecting a pulsed radio-frequency power into the inductively coupled plasma as a pulsed plasma power (see figs. 4-6 and their description).

Kadomura fails to expressly disclose matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. Collins et al. discloses utilizing a matching circuit 34 to match the impedance of the ICP coil generator 30 with the ICP source 20 (see col. 3-lines 1-18). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kadomura so as to match the impedance of the ICP coil generator with the ICP source as suggested by Collins et al. because this will maximize the efficiency of power coupling to the ICP source.

Concerning the oscillator feedback loop being a Meissner oscillator, apparatus limitations, unless they affect the process in a manipulative sense, may have little weight in process claims. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 CCPA 1947).

Kadomura and Collins et al. do not expressly disclose wherein the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, so as to provide rapid switching between the plasma power pulses

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and interpulse periods, wherein the variation of the frequency is automatically performed by an oscillator feedback loop between the ICP coil and the ICP coil generator. Wilbur discloses wherein the ICP coil generator 13 causes a variation of the frequency of the radio-frequency alternating field so that the impedance within the plasma chamber is matched by an oscillator feedback loop (see reference number 20) between the ICP coil and the ICP coil generator (see abstract and fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kadomura modified by Collins et al. so as to perform the impedance matching of Wilbur because this will improve the power efficiency of the plasma apparatus.

Kadomura, Collins et al. and Wilbur are applied as above but fail to expressly disclose wherein the pulsing of the radio-frequency power is accompanied by a change of the frequency of the injected radio-frequency power, the frequency change being controlled in such a way that the plasma power injected into the inductively coupled plasma during the pulsing is maximized. Koshimizu discloses shifting the frequency higher during pulse plasma processing to enhance the ignition of the plasma (see abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kadomura modified by Collins et al. and Wilbur so as to shift the frequency of the pulses higher as suggested by Koshimizu in order to improve the ignition of the plasma.

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With respect to claim 43, the pulsed plasma power is injected via an ICP source to which a radio-frequency electromagnetic alternating field having a constant frequency is applied around a stationary frequency.

Concerning claims 47 and 62, Kadomura discloses generating a pulsed magnetic field, the direction of which is at least approximately or predominantly parallel to a direction defined by the connecting line of the substrate and the inductively coupled plasma.

Regarding claims 50 and 63, a pulsed radio frequency power is applied to the substrate via a substrate voltage generator.

With respect to claim 71, note that the ICP coil generator in Kadomura will inherently contain integrated components in order to ensure proper operation of the generator.

Kadomura fails to expressly disclose the claimed pulsed frequency, pulse to pause ratio, plasma power, individual pulse powers of the radio-frequency pulses, magnetic field strength amplitude, magnetic field pulse frequency, magnetic field pulse to pause ratio. However, with respect to processing parameters such as the particular pulse length, power, and frequency of the RF waves as well as parameters of the magnetic field, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum values of these parameters based upon a variety of factors including the desired strength of the plasma, and would not lend patentability to the instant application absent the showing of unexpected results.

Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadomura, U.S. Patent 5,662,819 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687, as applied to claims 42-45, 47-53, and 61-71, and further in view of Laermer et al., U.S. Patent 5,501,893.

Kadomura, Collins et al., Wilbur and Koshimizu are applied as above but fails to expressly disclose wherein the etching takes place in alternating etching and passivation steps at a process pressure of 5 microbars to 100 microbars. Laermer et al. discloses performing alternating etching and passivation steps at a process pressure of 10 to 100 microbars (see fig. 1 and col. 4-line 23 to col. 5-line 65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kadomura modified by Collins et al., Wilbur, and Koshimizu so as to perform the etching process of Laermer et al. because this is a suitable process to be performed in a plasma etching apparatus.

Claims 42-45, 50-54, 56-59, 61, and 63-71 are rejected under 35 USC 103(a) as being unpatentable over Savas, WO 97/14177 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687.

Savas shows the invention as claimed including a method for etching a silicon body substrate using an inductively coupled plasma comprising an ICP source (150a, 150b) for generating a radio-frequency electromagnetic alternating field, a reactor 100

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for generating the inductively coupled plasma from reactive particles by the action of the radio-frequency electromagnetic alternating field on a reactive gas, and a first means for generating plasma power pulses to be injected into the inductively coupled plasma by the ICP source, the method comprising the step of injecting a pulsed radio-frequency power into the inductively coupled plasma as a pulsed plasma power (see fig. 1 and page 6, line 10 to page 13, line 19).

Savas does not expressly disclose matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. Collins et al. discloses utilizing a matching circuit 34 to match the impedance of the ICP coil generator 30 with the ICP source 20 (see col. 3-lines 1-18). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Savas so as to match the impedance of the ICP coil generator with the ICP source as suggested by Collins et al. because this will maximize the efficiency of power coupling to the ICP source.

Savas and Collins et al. do not expressly disclose wherein the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, so as to provide rapid switching between the plasma power pulses and interpulse periods. Wilbur discloses wherein the ICP coil generator 13 causes a variation of the frequency of the radio-frequency alternating field so that the impedance within the plasma chamber is matched by an oscillator feedback loop (see reference number 20) between the ICP coil and the ICP coil generator (see abstract and fig. 1 and

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its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Savas modified by Collins et al. so as to perform the impedance matching of Wilbur because this will improve the power efficiency of the plasma apparatus.

Savas, Collins et al. and Wilbur are applied as above but fail to expressly disclose wherein the pulsing of the radio-frequency power is accompanied by a change of the frequency of the injected radio-frequency power, the frequency change being controlled in such a way that the plasma power injected into the inductively coupled plasma during the pulsing is maximized. Koshimizu discloses shifting the frequency higher during pulse plasma processing to enhance the ignition of the plasma (see abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Savas modified by Collins et al. and Wilbur so as to shift the frequency of the pulses higher as suggested by Koshimizu in order to improve the ignition of the plasma.

Concerning the oscillator feedback loop being a Meissner oscillator, apparatus limitations, unless they affect the process in a manipulative sense, may have little weight in process claims. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 (CCPA 1947).

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With respect to claim 43, in Savas, the pulsed plasma power is injected via an ICP source to which a radio-frequency electromagnetic alternating field having a constant frequency is applied around a stationary frequency.

Concerning claims 50 and 63, in Savas, the pulsed radio frequency power 152 is applied to the substrate via a substrate voltage generator.

With respect to claims 54 and 57, note that a frequency of 13.56 MHz is used and the pulse to pause ratio of the injected radio-frequency pulses is at least greater than 1:1, and the pulses are applied simultaneously (see page 9, lines 1-28 of Savas).

With respect to claim 71, note that the ICP coil generator of Savas will inherently contain integrated components in order to ensure proper operation of the generator.

Savas does not expressly disclose the claimed pulsed radio-frequency, pulse to pause ratio, plasma power, individual pulse powers of the radio-frequency power pulses, pulse duration of the radio-frequency power, time-average power to the substrate, a maximum power of an individual pulse, and the respective claimed correlations and synchronizations. However, with respect to the processing parameters such as the particular pulse length, power, and frequency of the RF waves as well as the synchronization between the antenna and substrate pulses, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum values of these parameters, based upon a variety of factors including the desired strength or density of the plasma, and would not lend patentability to the instant application absent the showing of unexpected results.

Claims 47-49, 55, and 62 are rejected under 35 USC 103(a) as being unpatentable over Savas, WO 97/14177 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687, as applied to claims 42-45, 50-54, 56-59, 61, and 63-71, and further in view of Lymberopoulos et al., U.S. Patent 6,085,688.

Savas, Collins et al., Wilbur, and Koshimizu are applied as above but fails to expressly disclose a pulsed magnetic field and the parameters of the magnetic field as claimed along with the applying the magnetic field first, before a radio frequency power pulse of the ICP generator, and the magnetic field is switched off again after the decay of the radio-frequency power pulse. Lymberopoulos et al. discloses applying a pulsed magnetic field in an area of the substrate and perpendicular to a line between the substrate and an ICP source in order to control the plasma (see figs. 5, 10-13, and abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Savas modified by Collins et al., Wilbur, and Koshimizu to apply a pulsed magnetic field as taught by Lymberopoulos et al. because the pulsed magnetic field can be used to selectively control plasma density or to selectively confine process gas species (see last two lines of abstract).

With respect to processing parameters such as the strength of the magnetic field and frequency of the pulses of the magnetic field as well as the synchronization of the magnetic and antenna pulses, it would have been obvious to one of ordinary skill in the

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art at the time the invention was made to determine through routine experimentation the optimum values of these parameters based upon a variety of factors including the desired strength of the plasma, and would not lend patentability to the instant application absent the showing of unexpected results.

Claim 60 is rejected under 35 USC 103(a) as being unpatentable over Savas, WO 97/14177 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687, as applied to claims 42-45, 50-54, 56-59, 61, and 63-71, and further in view of Laermer et al., U.S. Patent 5,501,893.

Savas, Collins et al., Wilbur, and Koshimizu are applied as above but fails to expressly disclose wherein the etching takes place in alternating etching and passivation steps at a process pressure of 5 microbars to 100 microbars. Laermer et al. discloses performing alternating etching and passivation steps at a process pressure of 10 to 100 microbars (see fig. 1 and col. 4-line 23 to col. 5-line 65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Savas modified by Collins et al., Wilbur, and Koshimizu so as to perform the etching process of Laermer et al. because this is a suitable process to be performed in a plasma etching apparatus.

Claims 42-45, 50-53, 61, and 63-71 are rejected under 35 USC 103(a) as being unpatentable over Koshimizu, U.S. Patent 5,935,373 in view of Collins et al., U.S.

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Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687.

Koshimizu '373 shows the invention as claimed including a method for etching a silicon body substrate using an inductively coupled plasma comprising: an ICP source 118 for generating a radio-frequency electromagnetic alternating field, a reactor 102 for generating the inductively coupled plasma from reactive particles by the action of the radio-frequency electromagnetic alternating field on a reactive gas, and a first means for generating plasma power pulses 154 to be injected into the inductively coupled plasma by the ICP source, the method comprising the step of injecting a pulsed radio-frequency power into the inductively coupled plasma as a pulsed plasma power (see figs. 1-3B and their description).

Koshimizu '373 does not expressly disclose matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. Collins et al. discloses utilizing a matching circuit 34 to match the impedance of the ICP coil generator 30 with the ICP source 20 (see col. 3-lines 1-18). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Koshimizu '373 so as to match the impedance of the ICP coil generator with the ICP source as suggested by Collins et al. because this will maximize the efficiency of power coupling to the ICP source.

Koshimizu '373 and Collins et al. are applied as above but fail to expressly disclose wherein the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a

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function of the pulsed plasma power to be injected, so as to provide rapid switching between the plasma power pulses and interpulse periods. Wilbur discloses wherein the ICP coil generator 13 causes a variation of the frequency of the radio-frequency alternating field so that the impedance within the plasma chamber is matched by an oscillator feedback loop (see reference number 20) between the ICP coil and the ICP coil generator (see abstract and fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Koshimizu '373 modified by Collins et al. so as to perform the impedance matching of Wilbur because this will improve the power efficiency of the plasma apparatus.

Koshimizu, '373, Collins et al. and Wilbur are applied as above but fail to expressly disclose wherein the pulsing of the radio-frequency power is accompanied by a change of the frequency of the injected radio-frequency power, the frequency change being controlled in such a way that the plasma power injected into the inductively coupled plasma during the pulsing is maximized. Koshimizu '687 discloses shifting the frequency higher during pulse plasma processing to enhance the ignition of the plasma (see abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Koshimizu '373 modified by Collins et al. and Wilbur so as to shift the frequency of the pulses higher as suggested by Koshimizu '687 in order to improve the ignition of the plasma.

Concerning the oscillator feedback loop being a Meissner oscillator, apparatus limitations, unless they affect the process in a manipulative sense, may have little

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weight in process claims. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 (CCPA 1947).

With respect to claim 43, the pulsed plasma power in Koshimizu '373 is injected via an ICP source to which a radio-frequency electromagnetic alternating field having a constant frequency is applied around a stationary frequency.

Regarding claims 50 and 63, a pulsed radio frequency power is applied to the substrate via a substrate voltage generator in Koshimizu '373. Also, note that the pulsing of the injected plasma power and the pulsing of the radio-frequency power injected into the substrate via the substrate voltage generator are time-correlated or synchronized with each other in Koshimizu '373.

With respect to claim 71, note that the ICP coil generator of Koshimizu '373 will inherently contain integrated components in order to ensure proper operation of the generator.

Koshimizu '373 does not expressly disclose the claimed pulsed frequency, pulse to pause ratio, plasma power, individual pulse powers of the radio-frequency power pulses, pulse duration of the radio-frequency power injected into the substrate, time-average power to the substrate, maximum pulse power, frequency of the injected radio-frequency power, pulse to pause ratio and the claimed correlations and synchronizations. However, with respect to processing parameters such as the particular pulse length, power, frequency of the RF waves, and synchronization

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between the antenna and substrate pulses, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum values of these parameters based upon a variety of factors including the desired strength of the plasma, and would not lend patentability to the instant application absent the showing of unexpected results.

Claims 47-49, 54-59, and 62 are rejected under 35 USC 103(a) as being unpatentable over Koshimizu, U.S. Patent 5,935,373 in view of Collins et al., U.S. Patent 6,217,785, Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687, as applied to claims 42-45, 50-53, 61, and 63-71, and further in view of Lymberopoulos et al., U.S. Patent 6,085,688.

Koshimizu '373, Collins et al., Wilbur, and Koshimizu '687 are applied as above but fail to expressly disclose a pulsed magnetic field and the parameters of the magnetic field as claimed along with the applying the magnetic field first, before a radio frequency power pulse of the ICP generator, and the magnetic field is switched off again after the decay of the radio-frequency power pulse. Lymberopoulos et al. discloses applying a pulsed magnetic field in an area of the substrate and perpendicular to a line between the substrate and an ICP source in order to control the plasma (see figs. 5, 10-13, and abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Koshimizu '373 modified by Collins et al., Wilbur, and Koshimizu '687 to apply a pulsed magnetic field as taught by Lymberopoulos et al. because the pulsed magnetic field can

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be used to selectively control plasma density or to selectively confine process gas species (see last two lines of abstract).

With respect to processing parameters such as the strength of the magnetic field and frequency of the pulses of the magnetic field as well as the synchronization of the magnetic and antenna pulses, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum values of these parameters based upon a variety of factors including the desired strength of the plasma, and would not lend patentability to the instant application absent the showing of unexpected results.

Furthermore, with respect to claims 56-58, the correlation takes place in Koshimizu '373 so that during a portion of the time in which the power pulse of the ICP generator is switched on, the radio-frequency power injected to the substrate is switched off, and the correlation also takes place so that during a portion of the time in which the radio-frequency power pulse is injected to the substrate, the power injected to the ICP generator is switched off. Additionally, during another portion of the time the power pulse to the ICP generator or the RF power injected to the substrate is turned on, the RF power and ICP generator, respectively, are also on. Also, the radio frequency power applied to the substrate can be generated during a power rise of a radio frequency power pulse injected into the plasma via the ICP coil generator.

Claim 60 is rejected under 35 USC 103(a) as being unpatentable over Koshimizu, U.S. Patent 5,935,373 in view of Collins et al., U.S. Patent 6,217,785,

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Wilbur, U.S. Patent 6,020,794, and Koshimizu, U.S. Patent 5,997,687, as applied to claims 42-45, 50-53, 61, and 63-71, and further in view of Laermer et al., U.S. Patent 5,501,893.

Koshimizu '373, Collins et al., Wilbur, and Koshimizu '687 are applied as above but fails to expressly disclose wherein the etching takes place in alternating etching and passivation steps at a process pressure of 5 microbars to 100 microbars. Laermer et al. discloses performing alternating etching and passivation steps at a process pressure of 10 to 100 microbars (see fig. 1 and col. 4-line 23 to col. 5-line 65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Koshimizu '373 modified by Collins et al., Wilbur, and Koshimizu '687 so as to perform the etching process of Laermer et al. because this is a suitable process to be performed in a plasma etching.

Response to Arguments

Applicant's arguments filed 8/12/05 have been fully considered but they are not persuasive.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

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reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Furthermore, as disclosed above, Wilbur discloses wherein the ICP coil generator 13 causes a variation of the frequency of the radio-frequency alternating field so that the impedance within the plasma chamber is matched by an oscillator feedback loop (see reference number 20) between the ICP coil and the ICP coil generator (see abstract and fig. 1 and its description)

Furthermore, with respect to the references not disclosing a Meissner oscillator, apparatus limitations, unless they affect the process in a manipulative sense, may have little weight in process claims. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 (CCPA 1947).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro
Primary Examiner
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